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ABSTRACT OF THE DISCLOSURE

Genes encoding Class II EPSPS enzymes are disclosed. The genes are useful in producing transformed bacteria and plants which are tolerant to glyphosate herbicide. Class II EPSPS genes share little homology with known, Class I EPSPS genes, and do not hybridize to probes from Class I EPSPS's. The Class II EPSPS enzymes are characterized by being more kinetically efficient than Class I EPSPS's in the presence of glyphosate. Plants transformed with Class II EPSPS genes are also disclosed as well as a method for selectively controlling weeds in a planted transgenic crop field.